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THE IMPORTANCE OF RANGE OF MOTION, STRENGTHENING,
AND POSITIONING INTERVENTIONS IN INFANTS WITH
CONGENITAL MUSCULAR TORTICOLLIS

by

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Doctorate of Physical Therapy
University of North Dakota, 2007

A Scholarly Project

Submitted to the Graduate Faculty of the

Department of Physical Therapy

School of Medicine

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for the degree of

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This Scholarly Project, submitted by Theresa Wiederoder in partial fulfillment of the requirements for the Degree of Doctor of Physical Therapy from the University of North Dakota, has been read by the Advisor and Chairperson of Physical Therapy under whom the work has been done and is hereby approved.


(Graduate School Advisor)


(Chairperson, Physical Therapy)

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Title The Importance Of Range Of Motion, Strengthening, And
Positioning Interventions In The Treatment Of Infants With
Congenital Muscular Torticollis

Department Physical Therapy

Degree Doctor of Physical Therapy

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ABSTRACT

Background and Purpose: Treatment of an infant with torticollis is most effective when the parents/guardians of the infant are instructed in stretching protocols as well as proper positioning of the infant in many positions. This case report describes the course of treatment of an infant with congenital muscular torticollis.

Case Description: The child was born with a right sided sternocleidomastoid tumor and associated limitations in cervical left lateral flexion and right rotation. His parents received written stretching instructions from the pediatric surgeon's office, but were uncomfortable with stretching their child's neck and required more one-on-one instruction. Intervention included cervical and scapular passive range of motion (PROM), proper positioning demonstrations, active range of motion activities, as well as home instruction for the parents.

Outcomes: The infant had normal cervical PROM and active range of motion (AROM) after 2 months of treatment.

Discussion: This case suggests that PROM combined with proper positioning and AROM activities does speed the rate of recovery in an infant with congenital muscular torticollis.

Key Words: Congenital Muscular Torticollis, Cervical Passive Range Of Motion, Proper Positioning, Developmental Strengthening Activities

CHAPTER 1

INTRODUCTION

The patient that I chose for this study is a 3-month old infant with congenital muscular torticollis. This disorder is found to occur much more frequently since doctors have recommended that infants be placed in supine to sleep.¹ Currently, this disorder is found in about 1% of the infants born.¹ Torticollis is literally translated to “twisted neck”. It is characterized by the head being tipped to one side while the chin is turned to the other one.²

The presence of congenital muscular torticollis in infants is the third most common congenital musculoskeletal problem, with dislocated hip being first and clubfoot being second.³ Those infants who are large or have had a difficult delivery seem to be especially at risk for torticollis. The exact etiology is unknown but is thought to occur due to tearing and bleeding of the sternocleidomastoid muscle during a difficult delivery. Due to the pressure of this blood on the muscle within its fascia, ischemia occurs and fibrous tissue replaces part of the muscle. This tissue effectively shortens the muscle and torticollis results.³

A review of the literature indicated that the younger the child with congenital muscular torticollis is identified and has passive stretching initiated the greater likelihood that they will recover full range of motion.^{3,5} It is generally supported that if the child receives treatment before the age of 1, then there is 90% likelihood that corrective surgery can be avoided. Some studies indicate that if the child starts treatment in the first 3 months, that percentage of success can be as high as 95%.^{3,5,6,7,8}

Two case studies that were documented by Livingston and Saluti proved that effective treatment of infants with congenital muscular torticollis(CMT) centered around passive and active neck range of motion activities, strengthening activities of the neck musculature, and positioning of the infant to promote midline posturing of the head and neck.³ Most practicing therapists recommend stretching the neck typically during diaper changes to optimize the effectiveness of the stretching³. Taylor and Norton conducted a study on the outcomes of strengthening and positioning strategies as opposed to just stretching in children with CMT who were aged 3 weeks to 10.5 months. They found that 96% of the children had good to excellent results 14 months post –evaluation and had no observable head tilt. The children were seen an average of 3.8 treatments.¹²

The purpose of this report is to demonstrate that an effective home program for the treatment of congenital muscular torticollis (CMT) should be started within the infant's first 3 months. It should include both passive range of motion (PROM) and active range of motion (AROM) exercises, and should include proper infant positioning demonstrations and follow-up for parents.

CHAPTER II

CASE DESCRIPTION

History

The client was a 6-week old male infant who was born at 37 weeks gestation via a Caesarian section as he was in the “breech” position at delivery. He presented with right-sided torticollis and a noticeable sternocleidomastoid tumor on the right side of his neck. His parents took him to see a pediatric surgeon for assessment of the tumor when he was 5 weeks old. X-rays taken of his upper thoracic and cervical spine showed no conclusive abnormalities of the spine itself. The surgeon theorized that due to the infant’s positioning at birth, he had some trauma to his sternocleidomastoid muscle resulting in CMT. The parents were then given a written home stretching program and told to follow up with a physical therapist. They also had a follow-up appointment with the pediatric surgeon. His mother stated at the initial physical therapy visit that she was still uncomfortable in knowing how far to stretch her son’s neck muscles and how often to do the stretches. Parent goals were that the infant gain normal neck flexibility and gross motor developmental skills. They also wanted to avoid any surgery for the torticollis. The infant was taking medication for gastric reflux disorder.

Evaluation

At the start of physical therapy treatment, this infant held his head rotated to the left and laterally flexed to the right in supine and prone lying as well as in supported sitting. He did not tolerate prone lying longer than a couple minutes and had difficulty raising his head to look up in prone lying. He had difficulty bringing his head to focus on anything in midline in front of him in supine or supported sitting. His parents had a home

program for passive stretching for improving his cervical range of motion which they were doing several times a day.

The Alberta Infant Motor Scale (AIMS) was used to assess his developmental skill level. The AIMS is noted to be a reliable and valid instrument for the measurement of infant motor development and is norm-referenced for children from 0-18 months old.¹⁰ Goniometric measurement of the infant's cervical and shoulder active and passive range of motion was done while the infant was in the supine position as he didn't tolerate the prone position and did not have good head control due to his age. Observation of his visual tracking while in supine was also done.

Table 1 outlines the results of administering the AIMS as well as the goniometric measurements at the initial and final examination.

Table 1. Findings during the initial and final assessment		
Examination Item	Findings of Initial Exam	Findings at Final Exam
Alberta Infant Scale	scored at 10 th percentile	scored at 90 th percentile
PROM (in degrees)		
Cervical	Rotation R-30, L-WNL	Rotation R& L-WNL
	Lat. Flexion R-WNL, L-20	Lat. Flexion R&L-WNL
	Flexion, Extension-WNL	Flexion, Extension-WNL
Upper and Lower Ext.	WNL	WNL
AROM (estimated)		
Cervical	Rotation R-0, L-WNL	Rotation R&L-WNL
	Lat. Flexion R-WNL, L-0	Lat. Flexion R&L-WNL
	Flexion and Extension-WNL	Flexion & Extension-WNL
Upper and Lower Ext.	WNL	WNL

Developmental delays were identified which appeared to be partially attributed to the fact that he was only able to turn his head to midline in supine and was unable to rotate his head from one side to the other in prone. He was able to raise his head to 45 degrees, but was unable to sustain this position for longer than a few seconds. He was also unable to get in to prone on elbows without assistance. He was able to visually track an object from the left to midline, but not past midline.

A systems review was done by interviewing the infant's mother. The infant had just had a 4 week physical and the only anomaly found by the physician was that the child had a muscular tumor, which was limiting his cervical range of motion. Coincidentally, as identified at the initial physical therapy assessment, the infant also was delayed with his developmental skills for his age secondary to the presence of the torticollis. The infant was sucking normally and appeared to be in good general health for his age. Congenital torticollis is found under the physical therapy diagnosis subheading of impaired posture. This is found in the Guide to Physical Therapy Practice under torticollis, unspecified and has an ICD-9 Code of 723.5.¹¹

Prognosis and Plan of Care

The plan of care included PROM, AROM activities, as well as demonstrating and giving out a written home program for his parents to follow. The home program addressed PROM, AROM activities and proper positioning. Goals set for this infant were: to have full cervical PROM and AROM, and to demonstrate normal development when reassessed with the AIMS in two months time.

The optimal level of improvement would be to have normal cervical passive and active range of motion. In terms of development, the optimal level would be to have the infant be at the 50% on the AIMS for his age.

Short Term Goals:

Goal #1- Child will have normal cervical passive range of motion in rotation and lateral flexion in 2 months time; cervical rotation= $0-100^{\circ}$ and cervical lateral flexion = $0-90^{\circ}$. Goal #2- Child will have normal active cervical range of motion in 2 months time; cervical rotation= $0-90^{\circ}$ and cervical lateral flexion= $0-90^{\circ}$.

Long Term Goal:

Child will be in the 50th percentile for his age on the AIMS in 6 months time.

Intervention

The infant was seen in his home one time a week with his mother present. He was also initially seen at a clinic setting by a physical therapist one time a week for the first couple weeks after being referred by the pediatric surgeon. The surgeon had requested two visits a week for physical therapy as per his office protocol for an infant with CMT. The parent wanted some advice regarding activities that could be done in their home and felt that home visits were as important as being seen in the outpatient clinic.

Initially, a review of the home exercise program was done with the infant's mother. The exercises included passive stretch into right cervical rotation and left lateral flexion at each daytime diaper change (approximately 4-5 times a day). One study by Celayir stated that passive range of motion exercises should be done every 3 hours.⁵ The emphasis was placed on having the infant in a relaxed state and doing the exercises

gently and slowly. As the infant slept on his back, it was also suggested to put a towel roll on his left side to keep his head in neutral position. It was also suggested to the mother to use a towel roll to support his head in the neutral position when in his car seat or swing.

Prone lying activities were encouraged to be done at least 3-4 times a day for at least 5 minutes at time as the infant didn't tolerate prone lying for any longer than this. Toys were placed on his right side to encourage head turning to the right, as well as having his mom talk to him from the right side. Other studies by Cheng, et.al, Celayir, and Demirbilek and Atayurt support that manual stretching plus active strengthening result in 95% of the infants involved avoiding future corrective surgery for their CMT.^{5,6,7,8} A towel roll was initially placed for support under his chest while encouraging prone on elbows activities.

For the first month, weekly therapy sessions were held with the infant and his mother. The treatment sessions consisted of manual stretching in to right cervical rotation and left lateral flexion. I also gently depressed the upper surface of the lateral third of the clavicle, while holding his head in neutral to stretch his sternocleidomastoid muscle on the right. Having toys placed on his right side and talking to him from the right when he was in supine, prone or supported sitting was done to encourage active movement of his head. Gradually, the towel roll was eliminated as the infant gained active cervical rotation range of motion to about 30 degrees on the right and tolerated the prone position for 5-10 minutes. His mother felt comfortable with the exercises and stretching at that point in time and every other week visits were scheduled. She also stated that he was able to lie in prone and was able tolerate his head rotated to the left

while napping. She continued to do the stretches and prone lying activities at the same frequencies as had previously been initiated. No other health professionals were consulted, as there were no other concerns by either the parents or the physician at that time.

Outcomes at Discharge

At the end of two months, the infant was 4 months old and was reassessed using the Alberta Infant Motor Scale and goniometric measurement of his cervical range of motion. His cervical passive range of motion was within normal limits for all motions as was his active range of motion. He scored at the 90th percentile for his age level on the AIMS. He was therefore discharged from physical therapy services with instructions for his mother regarding typical infant development for the next couple months and instructed to call us if she felt he was not progressing well developmentally. We did not get a call back from the mother, so it was assumed that he continued to progress normally developmentally.

CHAPTER III

DISCUSSION

Due to the infant's age at the start of the intervention and the parent's compliance with the home exercise and activity program, the infant was able to attain full passive and active cervical range of motion within two months of the start of intervention. He had no spinal abnormalities or any other disease processes involved which could have also contributed to his speed of recovery. The other studies by Livingston and Saluti, Cheng, et.al., Celayir, and Emery support this intervention and the results that occurred based on parental compliance and early age of intervention.^{3,4,5,9}

The clinical implications of this study seem to emphasize that the compliance of parents with a strict passive range of motion, proper positioning and active range of motion program with an infant with CMT would facilitate development and increase the rate of recovery of the infant from CMT. This study is limited in that it applies to infants that have no spinal abnormalities or other disease processes. It also involves an infant with normal cognition who is motivated by age appropriate toys and has an appropriate attachment to his parents. No facial or cranial abnormalities developed either, which would have required additional interventions. This case study's results were admittedly limited as there was only one child studied. However, when looking at other case studies, it appears that the outcome of the physical therapy intervention with this infant would seem to be representative of the benefits of early intervention in a child with CMT.^{3,9}

In conclusion, it would appear that there are several variables to achieving a successful intervention in correcting CMT in infants. The most important variable

appears to have the interventions start with a child prior to 3 months of age. The second, just as important, variable is having parents who are compliant with the demonstrated home program for cervical PROM and AROM activities as well as knowledge regarding proper positioning to assist in the full recovery of the infant with CMT.

REFLECTIVE PRACTICE

If another infant was referred to me with the diagnosis of congenital muscular torticollis, my therapy approach would be similar. I found that it was important to stress that the infant be placed in prone position for play times outside of sleeping time. Also, instructions were given to have the family do stretching exercises frequently during the day. I have come to realize that many parents are reluctant to stretch an infant's neck as they see their infant as being fairly fragile and are unsure as to how much to stretch.

One question that I didn't ask when I first evaluated the infant was regarding any medications that the infant might be on. I learned through talking with the mother during the many intervention sessions that he was on medications for gastric reflux disorder. One examination procedure that I would perform in the future that I did not do at this initial visit would be to check for exact measurements of his head in order to quantify any plagiocephaly that might be occurring. This would allow me to quantify any improvement that might be made and also to refer to a physician for possible helmet use. I wouldn't change the plan of care or seek further evidence to support the intervention that I did with this infant. However, if I would have had the measuring tools, I would have measured his head size and symmetry for specific measurements and may have referred the child back to the doctor for a possible referral for a helmet to assist in shaping his head a little more symmetrically. The mother was not concerned about this,

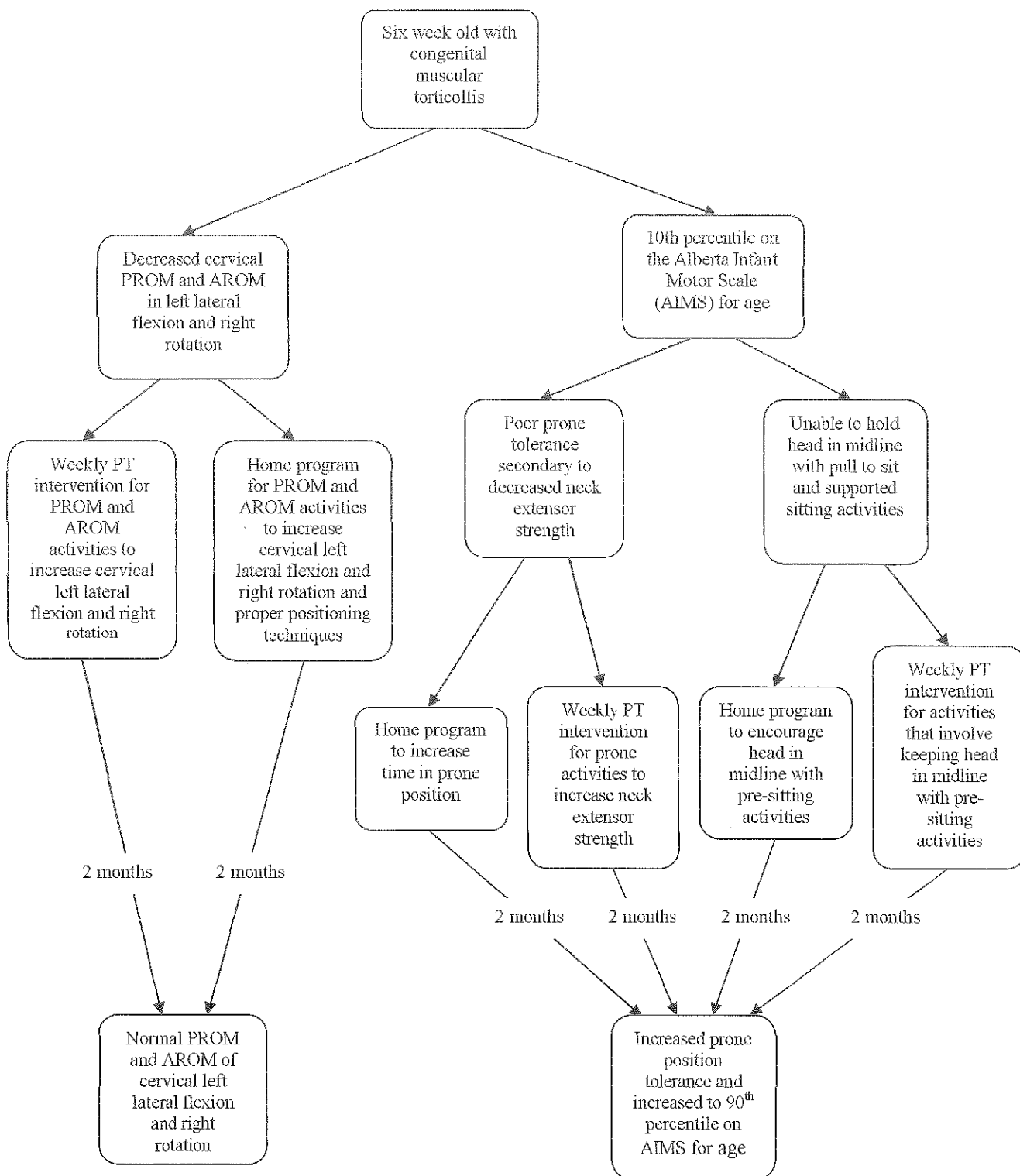
as he was only mildly asymmetrical, but I may have pushed for further inquiry into the possibility of getting a helmet for him had I had the tools to measure his head shape at the initial assessment.

In this particular case, there was no direct cost to the family as he was seen under the Early Intervention program in Michigan. The government supports this program and so the family incurred no direct cost. The mother was also on maternity leave, so there was no loss of pay associated with missing work for the intervention appointments. Under the philosophy of Early Intervention, children are seen in their natural environment, so the child was seen in his home. There are therefore no travel costs incurred by the family either. I realize that this is unique to Early Intervention services versus private therapy. Cost to the family didn't really enter in to the equation during these therapy sessions.

APPENDIX

Appendix A

Examination and Intervention Algorithm



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